



SWITCHBOARD

USER MANUAL

I-EE-ATLVS-20 v05

ABB AS
Low Voltage Systems

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1. OVERVIEW

This manual is issued for the transportation and installation of electrical equipment manufactured by ABB AS Low Voltage Systems. The manufacturer's goal is to offer a special optimized solution to every customer, which is handed over on time and in faultless condition. We would be thankful for all comments and suggestions and also for notices about faults in case they should occur.

2. SAFETY PRECAUTIONS

Commissioning and service of the switchboard should be done by authorized and qualified electrical personnel. Protective earth (PE) of the switchboard should be connected to the protective earth of the local area (site). Before switching on the power make sure that all safety covers and compartment separators installed on factory, are fitted back. Removing of the precaution signs is not allowed.

3. WARRANTY

ABB AS Low Voltage Systems (hereinafter also 'manufacturer') gives one year warranty for the distributed switchboard, unless it is determined otherwise by other agreements. Beginning of warranty is counted from the moment of delivery. In the case of a failure to fulfill articles 2 - 6 of this manual the warranty loses its validity. All faults which occur during the warranty period shall be repaired by the manufacturer.

The user of this switchboard bears sole responsibility for any malfunction which results from improper use or unauthorized modification from standard specification, damage or improper repair. The warranty does not cover fuses, filament lamps and devices shipped by the customer.

4. TRANSPORTATION AND STOCKING OF SWITCHBOARDS

- 4.1. Switchboards should always be fastened for transportation.
- 4.2. Switchboard should be loaded and stocked in such manner, that it is secured from weather conditions, blows and dust.
- 4.3. Painted surfaces of switchboards should not be loaded against each other. Switchboards should not be stocked against each other with front sides.
- 4.4. Switchboards' doors and covers should be kept closed.
- 4.5. Switchboard in the ordinary package is not to be stored for a long period in humid conditions or outdoors.

5. INSTALLING THE SWITCHBOARD

Switchboard of any type or size must be installed on even and solid surface. When installed on the wall, the surface must be even and all corners of the switchboard lean evenly to the wall or support profiles (subframe, tiebolts). When installed on the floor you must ensure that the cubicle base lies evenly on the supports. Otherwise the switchboard's frame may become deformed and doors will not close properly.

6. INSTALLATION OF THE SWITCHBOARD MANUFACTURED IN SEPARATE TRANSPORTATION UNITS (LK type switchboards)

Unpack transport units and place them side by side. Join switchboard units with bolts, according to the accompanied layout given by the manufacturer. Connect L1, L2, L3, N and PE-busbars. There is no need to remove back panel of the switchboard in order to connect the busbars. Busbar connection points are chosen so that they can be accessed by removing busbar compartment cover from the front of the switchboard. Always install switchboard on a steady surface or a wall. After installing a switchboard, ensure that the board is properly fixed.

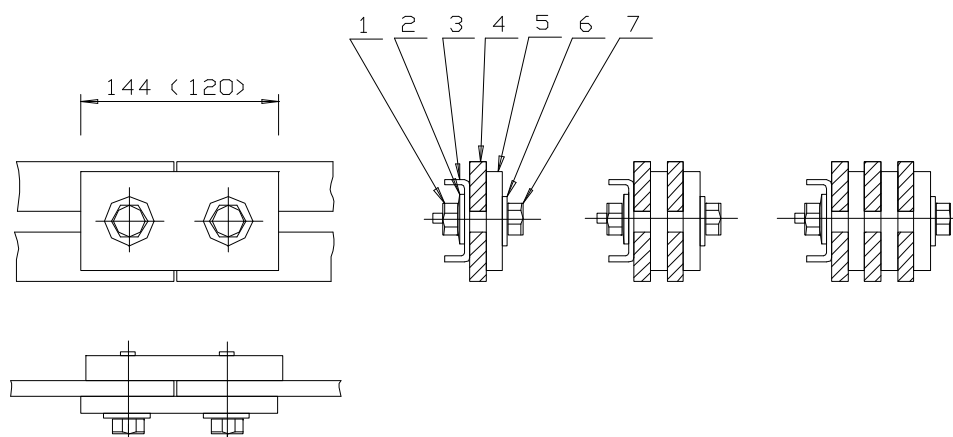
7. ELECTRICAL CONNECTIONS

7.1. LK type Switchgear

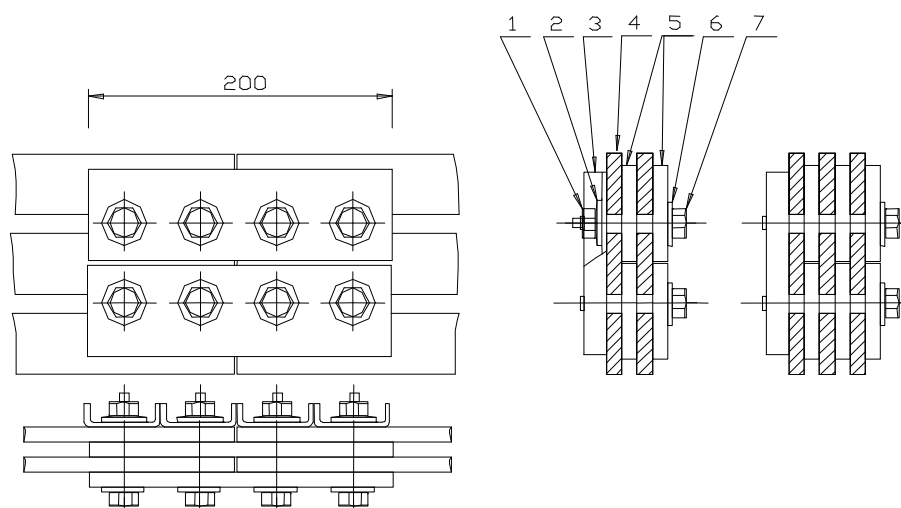
Perform connections between separate switchboard units according to the addresses on cables (device marking and terminal number). Cables are to be mounted through the openings supplied with edge protections in the cable ducts or using special flange plates.

Upon junctioning of the aluminium busbar systems use a wire brush to clean the clamps and contact surfaces. Before joining treat contact surfaces with contact grease (KY1 46-83 or analog). For tightening the conductive bolted joints use torque wrench.

Busbar connection ≤ 1600 A Al / 2500 A Cu



Busbar connection ≥ 2500 A Al / 4000 A Cu



LK BUSBAR CONNECTION																
PART	NAME OF PART	Qty/ 800A Al Qty/1000A Cu			Qty/1250A Al Qty/1600A Cu			Qty/1600A Al Qty/2500A Cu			Qty/2500A Al Qty/3150A Cu			Qty /3150A Al Qty/4000A Cu		
		L1..L3	N	PE	L1..L3	N	PE	L1..L3	N	PE	L1..L3	N	PE	L1..L3	N	PE
1	Hexagon nut M12 8	3x2	2		3x2	2		3x2	2		3x8	2	2	3x8	4	4
1	Hexagon nut M10 8			2			2			2						
2	Spring washer 12 (SFS 3737)	3x2	2		3x2	2		3x2	2		3x8	2	2	3x8	4	4
2	Spring washer 10 (SFS 3737)			2			2			2						
3	Connecting piece 252 3-LKH 10	3x1	1		3x1	1		3x1	1		3x4	1	1	3x4		
4	Al/Cu bar 10x20 busbar			2												
4	Al/Cu bar 10x30 busbar	3x2	2		3x4	2	2	3x6	4			4	4		6	6
4	Al/Cu bar 10x40 busbar										3x6			3x9		
4	Al/Cu bar 10x50 busbar									2						
5	Al/Cu - piece 10x30x120			2			2									
5	Al/Cu - piece 10x50x120									2						
5	Al/Cu - piece 10x60x144	3x1	1		3x2	1		3x3	2			2	2			
5	Al/Cu - piece 10x60x200										3x4			3x6	3	3
6	Plain washer 12 Ø 13/32 (SFS 738)	3x2	2		3x2	2		3x2	2		3x8	2	2	3x8	4	4
6	Plain washer 10 Ø 13/32 (SFS 738)			2			2			2						
7	Hexagon bolt M12x40 8.8	3x2	2			2										
7	Hexagon bolt M12x60 8.8				3x2				2		3x8	2	2			
7	Hexagon bolt M12x90 8.8							3x2						3x8	2	2
7	Hexagon bolt M10x50 8.8															
7	Hexagon bolt M10x70 8.8			2			2									
7	Hexagon bolt M10x90 8.8									2						

Check that there are no tools, screws or other loose parts left in the busbar compartment and that connection clearances are wide enough (10...14 mm)

Check that the screw connections are tight.

Check that N- and PE-busbars are connected correctly.

7.2. All switchgear types

Before connecting outer aluminium cables make sure that their contact surfaces are cleaned, brushed and greased. After 6 - 8 weeks the joinings should be tightened once again. Busbar connections and other inner connections made by manufacturer do not require extra tightening.

Torques to apply:

M5	3..4 Nm
M6	8..10 Nm
M8	18..22 Nm
M10	35..45 Nm
M12	65..75 Nm

8. COMMISSIONING / CONNECTING

The manufacturer has carried out routine tests on all switchboards according to the standard IEC 439-1:1992. Test protocol proving the tests have been performed is added to the product documentation. Nevertheless the manufacturer presumes that before commissioning (connecting to mains) the following is carried out:

8.1. Visual inspection

- 8.1.1. Inspection of documentation. Checking the presence of technical documentation and manuals.
- 8.1.2. Remove the pasted (stickers) plastic transport covers, which are placed to frequency covers, soft starters and to other similar devices. The covers are to protect the devices from dust.
- 8.1.3. Check-up of the switchboard for damages that may have occurred at the transportation, installation or at connecting of the outer lines.
- 8.1.4. If the switchboard was transported in separate units, special attention should be paid to the correct connecting of the units, as well as to the electrical connections and to the accordance with the torque given in article 5.
- 8.1.5. Check the conformity of all outer connections (inputs and outputs) to the standards. Special attention should be paid to the conformity of the input cable PEN, PE, N, enclosure grounding and repeated grounding connections. Attention should also be paid to the markings of these connections.
- 8.1.6. Check if the settings of all circuit-breakers and thermal relays (magnetic and thermal releases) conform to the project (in case of set-up need). Reset all meters.

***Factory settings are as follows:**

- Microprocessor controlled circuit breakers are set up if settings of the circuit breakers are described in the main circuit diagrams. Analog devices are set up to value $I_{device} = I_n$ (also in inputs)
 - if the project does not define otherwise, then the input circuit breakers are set up so that the protection would be guaranteed in case of the short-circuit: with S-function present $I_2 = 6...8 \times I_n$, $I_3 = 10 \times I_n$; with S function not present $I_3 = 6...8 \times I_n$
 - Automatic reserve switching devices are set up to guarantee the correct operations of automation
 - Other devices are set up only if demanded in the project
- 8.1.7. All objects not belonging to the switchboard, should be removed. Clean the switchboard from dust and residues of installation, if necessary, dry the unit (hot air blower recommended). Close all covers and doors, check the presence and correctness of all necessary signs. If any changes have been applied to the switchboard during installation, the documentation should be modified accordingly.

8.2. Electrical check

Check insulation resistance between switchboard conductors (L1, L2, L3 and N) with a megger ($U_m > 500V$) and accordingly to the enclosure. If the switchboard includes devices sensitive to the overvoltage (controller, modem etc), they should be disconnected from the switchboard by switching off mains switch (fuse) or by

disconnecting the feeder. Measuring-, control- and signal circuits should also be disconnected.

8.3. Electrification

- 8.3.1. Switch off all input and output circuit-breakers, switches and fuses. Also switch off the control circuit-breakers (fuses).
- 8.3.2. Switch on power on the switchboard input feeder (from outer distribution center). Check the correspondence of input voltage to the standards and switchboard's rated voltage.
- 8.3.3. Adjust the Automatic Reserve Switching Device (ARS), if any, according to the manual.
- 8.3.4. Switch on the main switch (main circuit-breaker, ARS control key, etc.).
- 8.3.5. Switch on output circuit breakers where necessary.
- 8.3.6. Make sure that all safety covers and partition walls, included at manufacturing are installed back on their places.

9. END OF LIFETIME

As long as many of the components which are installed into the boards include different kinds of metals (precious and black), at the end of the board's lifetime all metallic scrap should be given to the companies, which have corresponding license to handle metals, or metallic scrap.

The same rule is actual for the equipment, utilized during board's lifetime.

10. WHAT TO DO IF ...

- 10.1. the documentation is incomplete:**
Call +372 671 2700 and inform your contact person.
- 10.2. A-meter or kWh-meter is not working:**
Check if the current transformer bridges are removed and meter terminal bridges correctly connected.
- 10.3. some of outputs are dead:**
Check input voltage and check whether all necessary switches (circuit-breakers) are switched on and the fuses functional.
- 10.4. signal lamps do not light and control circuits do not operate:**
Check if the control circuit breaker (fuse) is switched on and outer blockings of control circuit (safety switches, thermal relays) are connected correctly.

ABB AS Low Voltage Systems hopes that this manual is useful at operating our switchboard and that our fruitful cooperation will continue !